

1 What is claimed is:

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3 **1.** A method of compiling, the method comprising the steps of:
4 parsing a source code;
5 performing a plurality of optimizations on the parsed code;
6 generating a plurality of configuration instruction sets based on the
7 optimized source code and;
8 automatically selecting one of the plurality of generated configuration
9 instruction sets according to a user-defined criteria, the selected configuration
10 instruction set being used to configure hardware.

11
12 **2.** The method according to claim 1, wherein the step of parsing further
13 comprises the step of:
14 parsing the source code into portions, wherein the portions include
15 computations.

16
17 **3.** The method of claim 1, wherein the step of automatically selecting further
18 comprises the steps of:
19 determining characteristics for the each of the plurality of the configurable
20 instruction sets; and
21 selecting one of the plurality of configuration instructions sets based on
22 determined the characteristics of that set, wherein the characteristics are associated with
23 the user-defined criteria.

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25 **4.** The method according to claim 3, wherein the step of determining
26 characteristics comprises receiving simulation results associated with each configuration
27 instruction set.

28
29 **5.** The method according to claim 1, wherein the step of performing
30 optimizations further comprises the steps of:

1 determining whether operations parsed from the source code are on a
2 critical path;
3 determining whether operations parsed from the source code have a
4 predetermined amount of slack; and
5 determining whether operations parsed from the source code are operable
6 to share resources.

7
8 **6.** The method according to claim 5, wherein the critical path is a plurality of
9 operations being performed simultaneously.

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11 **7.** The method according to claim 1, wherein the user defined criteria is the
12 speed to complete a computation, size of circuit, and circuit power.

13
14 **8.** The method according to claim 1, further comprising the steps of:
15 generating an internal representation of the source code.

16
17 **9.** The method according to claim 1, further comprising the steps of:
18 configuring hardware using the selected configuration instruction set.

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20 **10.** The method according to claim 9, wherein the hardware includes one of:
21 using the selected configuration instruction set to configure an FPGA or a
22 custom integrated circuit.

23
24 **11.** A method for compiling source code comprising steps of:
25 generating an internal representation of the source code;
26 analyzing data flow properties of the internal representation in order to
27 optimize the internal representation;
28 automatically generating a plurality of configuration instruction sets based
29 on the optimized internal representation;

generating a plurality of configuration instruction sets based on the optimized source code and;
automatically selecting one of the plurality of generated configuration instruction sets according to a user defined criteria, the selected configuration instruction set being used to configure hardware.

12. The method according to claim 11, wherein analyzing the data flow properties further comprises the steps of:

determining whether operations parsed from the source code are on a critical path;

determining whether operations parsed from the source code have a predetermined amount of slack; and

determining whether operations parsed from the source code are operable to share resources.

13. The method according to claim 12, wherein the critical path is a plurality of computations being performed simultaneously.

14. The method according to claim 11, wherein the step of automatically selecting further comprises the steps of:

determining characteristics for the each of the plurality of the configurable instruction sets; and

selecting one of the plurality of configuration instructions sets based on determined the characteristics of that set, wherein the characteristics are associated with the user-defined criteria.

15. The method according to claim 14, wherein the user defined criteria is the speed to complete a computation, size of circuit, and circuit power.

1 **16.** The method according to claim 11, further comprising the steps of:
2 configuring hardware using the selected configuration instruction set.

3
4 **17.** A system for using software to generate a circuit comprising:
5 a processor operable to receive source code;
6 a compiler automatically generating a plurality of configuration sets from
7 the received source code and selecting one of the plurality of configuration sets based on
8 user defined criteria; and
9 a configurable hardware device receiving the selected configuration
10 instruction set and being configured based on the received configuration instruction set.

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12 **18.** The system of claim 17, wherein the configurable hardware device is a
13 FPGA or custom circuit.

14
15 **19.** The system according to 17, wherein the compiler parses the source code
16 into an internal representation.

17
18 **20.** The system according to claim 17, wherein the compiler analyzes an
19 internal representation of the source code to generate the plurality of configuration
20 instruction sets.

21
22 **21.** The system according to claim 20, wherein the data flow system
23 determines whether operations parsed from the source code are on a critical path;
24 determines whether operations parsed from the source code have a predetermined amount
25 of slack; and determines whether operations parsed from the source code are operable to
26 share resources.

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28 **22.** The system of claim 17, wherein the system further comprises:
29 a memory device connected to the processor and stores the plurality of
30 configuration instruction sets.

1 **23.** A method for compiling, the method comprising the steps of:
2 means for parsing a source code;
3 means for performing a plurality of optimizations on the parsed code;
4 means for generating a plurality of configuration instruction sets based on
5 the optimized source code and;
6 means for automatically selecting one of the plurality of generated
7 configuration instruction sets according to a user-defined criteria, the selected
8 configuration instruction set being used to configure hardware.

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10 **24.** The method according to claim 23, wherein the means for parsing further
11 comprises the step of:
12 means for parsing the source code into portions, wherein the portions
13 include computations.

14
15 **25.** The method of claim 23, wherein the means for automatically selecting
16 further comprises the steps of:
17 means for determining characteristics for the each of the plurality of the
18 configurable instruction sets; and
19 means for selecting one of the plurality of configuration instructions sets
20 based on determined the characteristics of that set, wherein the characteristics are
21 associated with the user-defined criteria.

22
23 **26.** The method according to claim 25, wherein the means for determining
24 characteristics comprises receiving simulation results associated with each configuration
25 instruction set.